Competency 5.3 **Personnel shall demonstrate knowledge of the principles of electrical safety, referring to OSHA standards and the National Electrical Code, necessary to identify safe/unsafe work practices.**

1. Supporting Knowledge and Skills

a. Discuss the types of protection afforded by the following:
   - Fuses
   - Grounding devices
   - Circuit breakers

b. Discuss conditions which may result in electrical shock.

c. Given a workplace situation involving the use of electrical equipment, identify applicable standards using 29 CFR 1910.303(h)(3)(i), Subpart S to determine if the situation is in compliance and discuss the appropriate corrective measures.

d. Discuss the proper method for removing a victim from an energized circuit.

e. Discuss the general guidelines in the DOE Electrical Safety Guidelines, DOE/ID-10600

2. Self-Study Activities (corresponding to the intent of the above competency)

Below are two web sites containing many of the references you may need.

Web Sites		
Organization	**Site Location**	**Notes**
Department of Energy	http://wastenot.inel.gov/cted/stdguido.html	DOE Standards, Guides, and Orders
OSHA	http://www.osha-slc.gov/	OSHA documents and search engine
U.S. House of Representatives	http://law.house.gov/cfr.htm	Searchable Code of Federal Regulations

Review 29 CFR 1910, Subpart S and DOE/ID-10600: Electrical Safety Guidelines.

EXERCISE 5.3-A Discuss the types of protection afforded by the following:
- Fuses
- Grounding devices
- Circuit breakers

EXERCISE 5.3-B Discuss conditions that may result in electrical shock.

EXERCISE 5.3-C Given a workplace situation involving the use of electrical equipment, identify applicable standards using 29 CFR 1910 Subpart S to determine if the situation is in compliance, and discuss the appropriate corrective measures.

EXERCISE 5.3-D Discuss the proper method for removing a victim from an energized circuit.

EXERCISE 5.3-E Discuss the general guidelines in the DOE Electrical Safety Guidelines, DOE/ID-10600.

3. Summary

In order to identify safe/unsafe work practices and to respond correctly to hazardous situations, personnel need an understanding of electrical safety, basic electrical safety components, and emergency first aid for electrical shock. Knowing how various pieces of electrical devices function will assist the individual in daily work practices.

4. Exercise Solutions

EXERCISE 5.3-A Discuss the types of protection afforded by the following:
- Fuses
- Grounding devices
- Circuit breakers

ANSWER 5.3-A

Device	Protection
Fuses	Overcurrent devices with a circuit opening fusible part that is heated and severed by the passage of overcurrent through it. A fuse comprises all of the parts that form a unit capable of performing the prescribed functions.
Grounding Devices	Devices used to connect the circuit or equipment to “earth” or to some conducting body that serves in place of earth (ground).
Circuit Breakers	Devices designed to open and close circuits by nonautomatic means and to open circuits on a predetermined overcurrent without injury to the circuit breaker when properly applied within the rated voltage.

EXERCISE 5.3-B Discuss conditions that may result in electrical shock.

ANSWER 5.3-B Any condition or situation where an individual might place all or part of his or her body between a source of electrical energy and ground, allowing for current flow through all or part of the body.

EXERCISE 5.3-C Given a workplace situation involving the use of electrical equipment, identify applicable standards using 29 CFR 1910, Subpart S, to determine if the situation is in compliance, and discuss the appropriate corrective measures.

Scenario: In your workspace, a control panel for an electrical distribution system for the facility is to be installed. Voltages in the system are between 600 volts and 25,000 volts. The wall closest to where the panel is to be installed is a grounded wall constructed of concrete. Using 29 CFR 1910, Subpart S [1910.303(h)(3)(i) Table S-2], determine the "condition" that applies and the minimum distance the panel must be from the grounded wall.

ANSWER 5.3-C Condition 2 states "where there are exposed live components on one side and grounded parts on the other such as concrete, brick, and tile walls that are considered to be grounded parts.” The Table gives the distance needed for clearances for the various conditions.

Because this is facility-specific, see your supervisor and have him/her assign a situation within your workspace.

EXERCISE 5.3-D Discuss the proper method for removing a victim from an energized circuit.

ANSWER 5.3-D The preferred method of removing a person from an energized circuit is to deenergize the circuit before attempting his or her removal. If unable to deenergize, use a nonconducting rope, belt, strap, etc., to separate the person from the “live” source. Failing this, a person can be knocked away from the source by any means necessary.

EXERCISE 5.3-E Discuss the general guidelines in the DOE Electrical Safety Guidelines, DOE/ID-10600.

ANSWER 5.3-E DOE/ID-10600 provides general guidelines that discuss the reliability and effective maintenance of electrical systems and the planning and design for the layout of the systems, the safety-related training needed, and the testing procedures and the people eligible to perform those tests. These guidelines are to be used to supplement current orders, codes, standards, and regulations.